In re Patent Application of:
AMMAR
Serial No. **10/751,574**
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In the Claims:

Claims 1-22 (PREVIOUSLY CANCELLED)

23. (CURRENTLY AMENDED) A power combining apparatus comprising:

a dielectric substrate;

a plurality of microstrip transmission lines formed thereon in which RF signals can be transmitted, including one or more phase shifters associated with the microstrip transmission lines; and

a waveguide structure positioned such that said RF signals can transition from the transmission lines to the waveguide structure, wherein the waveguide structure is configured to power combine the RF signals with no significant additional losses beyond a loss inherent in said waveguide structure in a transition from the microstrip lines to the waveguide structure.

24. (ORIGINAL) A power combining apparatus according to Claim 23, wherein said waveguide structure comprises a waveguide opening positioned at a terminal of the transmission lines, and a waveguide backshort positioned opposite the waveguide opening.

25. (ORIGINAL) A power combining apparatus according to Claim 23, and further comprising one or more connections to a ground for isolating said waveguide structure from the transmission lines to the waveguide structure.

26. (ORIGINAL) A power combining apparatus according to Claim 23, wherein said plurality of microstrip transmission lines comprise at least four microstrip transmission lines.

27. CANCELLED

28. (CURRENTLY AMENDED) A microstrip-to-waveguide power combiner comprising:

a dielectric substrate;

at least two microstrip transmission lines formed thereon in which amplified radio frequency signals are transmitted and terminating in microstrip launchers at a microstrip-to-waveguide transition;

a waveguide structure positioned at the microstrip-to-waveguide transition such that said RF signals can transition from the transmission lines to the waveguide structure, wherein the waveguide structure is configured to power combine the RF signals with no significant additional losses beyond a loss inherent in said waveguide structure in the transition from the microstrip lines to the waveguide structure, said waveguide structure comprising a waveguide opening positioned at the transition and a waveguide back-short positioned opposite the waveguide opening at the transition; ~~and~~

a metallic plate on which the dielectric substrate is supported, and a back-short cavity formed within the metallic plate at the transition to form the waveguide back-short; and

isolation/ground vias formed within the dielectric substrate and around the transition that isolates the transition.

29. (ORIGINAL) A microstrip-to-waveguide power combiner according to Claim 28, wherein the radio frequency signals comprise microwave or millimeter wavelength signals.

30. CANCELLED

31. (CURRENTLY AMENDED) A microstrip-to-waveguide power combiner according to ~~Claim 30~~ Claim 28, wherein the back-short cavity has a depth ranging from about 25 to about 60 mils.

32. (CURRENTLY AMENDED) A microstrip-to-waveguide power combiner according to ~~Claim 30~~ Claim 28, wherein the waveguide back-short is positioned for reflecting energy into the waveguide opening.

33. (ORIGINAL) A microstrip-to-waveguide power combiner according to Claim 28, wherein each microstrip transmission line includes a power amplifier associated therewith and supported by said dielectric substrate.

34. (ORIGINAL) A microstrip-to-waveguide power combiner according to Claim 33, wherein the phase of power amplifiers is adjusted based on the location of microstrip launchers at the transition.

35. (ORIGINAL) A microstrip-to-waveguide power combiner according to Claim 34, wherein the number of microstrip launchers is either two or four and the respective phase of said power amplifiers is 180 degrees or 90 degrees apart

dependent on their location around the microstrip-to-waveguide transition.

36. (ORIGINAL) A microstrip-to-waveguide power combiner according to Claim 33, wherein the power amplifiers comprise microwave monolithic integrated circuits (MMIC).